

Bronchoscopic Assessment of Radiologically Detected Lung Lesion

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Abstract

Background: Radiologically detected lung lesions are very common in regular clinical practice. It is very important to diagnose radiologically detected lung lesions early. Flexible fiber-optic bronchoscopy is an excellent minimally invasive and safe investigation for early diagnosis of lung diseases.

Methods: Data were collected using a semi-structured questionnaire from the patients who had lesion on chest x-ray that were not in the peripheral part and advised for bronchoscopy. Patients were followed up after getting their histopathology. Statistical analysis using SPSS 16.0 was carried out thereafter.

Results: Mean age of the respondents was 56.8 years with age ranging from 25 to 85 years. 82% of the patients were male. Male-female ratio was 4.5:1. Endobronchial growth was found in maximum 46% patients during bronchoscopy, followed by 22% showing inflammatory lesion. In 20% of the patients, bronchoscopy findings showed normal findings and 12% patients showed inconclusive results. In subsequent biopsy and histopathology, maximum 55.88% showed non-neoplastic lesion. Among the non-neoplastic lesions 26.47% showed non-specific inflammation. 20.58% showed tuberculosis, 5.88% showed sarcoidosis and 2.94% showed aspergilloma. 35.29% cases showed neoplastic lesion, 2.94% showed inconclusive results, 2.94% showed normal results and 2.94% showed inadequate sample. 58.33% cases were squamous cell carcinoma, 25% cases were adenocarcinoma, 8.33% showed small cell carcinoma and 8.33% showed mixed cell type of carcinoma.

Conclusion: Fiberoptic bronchoscopy can be successfully employed for the diagnosis of lung diseases, including malignancies and granulomatous lesions. It is extremely useful in finding specific etiologies of various lung diseases.

DOI: <https://doi.org/10.3329/jom.v24i2.67272>

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Received: 23.12.2022;

Accepted: 15.05.2023

Introduction:

Lung lesions often cause diagnostic dilemma for the clinicians.¹ Lung lesions may be found as consolidation, unilateral or bilateral hilar enlargement, lobar collapse, solitary nodules, multiple nodules, cavitating lesions, pleural abnormalities, broadening of the mediastinum, elevation of a hemidiaphragm and rib destruction etc.²

Consolidation may be caused by infection, infarction, inflammation and broncho-alveolar cell carcinoma.

Unilateral hilar enlargement may be caused by tuberculosis, bronchial carcinoma and lymphoma. Bilateral hilar enlargement maybe caused by sarcoidosis, lymphoma, tuberculosis and silicosis.^{2,3}

Lobar collapse may be caused by mucous plugging, tumour, compression by lymph nodes. Solitary nodules commonly caused by bronchial carcinoma, single metastasis, localized pneumonia, lung abscess, tuberculoma and pulmonary infarct. Multiple nodules may be caused by miliary

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tuberculosis, dust inhalation, metastatic malignancy, healed varicella pneumonia, rheumatoid disease.²

Cavitating lesions maybe caused by tumour, abscess, infarct, pneumonia (staphylococcus/ klebsiella) and granulomatosis with polyangitis. Pleural abnormalities may be due to fluid, plaques, tumour.

Bronchial carcinoma may be presented as broadening of the mediastinum and rib destruction.² Bronchial carcinoma is a malignant neoplasm of the lung arising from the epithelium of the bronchus or bronchiole. It may grow into the bronchial lumen along the mucosa or into the bronchial wall and adjacent lung parenchyma. Major histologic types of bronchial carcinoma are squamous cell carcinoma, adenocarcinoma, small cell carcinoma, large cell carcinoma and bronchoalveolar cell carcinoma.

Early diagnosis and treatment can prolong the duration of life. Of all invasive techniques that have been introduced in recent years for the diagnosis of pulmonary disease, none has had greater impact than fiber-optic bronchoscopy. It has made a revolution in the diagnosis and management of inflammatory, infection and malignant diseases of the chest.⁴

Bronchoscopy allows visualization and sampling from the main airways. It is a good technique in diagnosing lung cancer, inflammatory and infective lung diseases.⁵

The indications for the bronchoscopic examination are extensive. The main diagnostic indications include pulmonary involvement by neoplasm, infections, diffuse lung diseases and airway problems.^{6,7,8} It is important to emphasize that the most common indication for bronchoscopy is for tissue sampling and determining the extent of lung cancer and it is, also, utilized extensively in the initial evaluation of patients suspected of having this pulmonary malignant pathology.^{9,10}

Significant number of the lung cancers can be detected and sampled by bronchoscopy, which is indicated in most patients in whom the diagnosis is suspected. Assessment of the lung lesion by bronchoscopy is very important because it help diagnosing the condition by biopsy, BAL and brushing. It also give very important clue about the resectability of the tumour and involvement of vocal cord by the malignant process^{11,12,13}

This study is aimed to bronchoscopic evaluation as well as histopathological diagnosis of radiologically detected lung lesions.

In this study selected patients were thoroughly interviewed, examined and investigated who are referred for bronchoscopy for having lung lesion in their chest x-ray that was located centrally. In relevant cases biopsy report

was collected to determine the final diagnosis. Also, assessment of the vocal cord, carina, trachea and bronchial tree will be done during bronchoscopy. Any hemorrhage, infiltration was also sought. After all these a conclusion was drawn to evaluate and assess the lung lesions.

Materials and Methods

It was a descriptive cross-sectional study. 50 consecutive adult (age >18 years) patients who were admitted in the Department of medicine and respiratory medicine of Dhaka Medical College Hospital from August 2016 to January 2017 with a radiologically detected lung lesions in their chest x-ray that do not disappear after a course of antibiotic after a significant portion of time, were included the study. Pregnant and terminally ill patient were excluded from the study. Peripheral lesions of the lung were also excluded. Informed written consent was taken from each patient before enrollment. The ethical review committee of the Dhaka Medical College approved the study.

Data were collected using a semi-structured questionnaire from the patients. Patients were followed up after getting their histopathology report. Statistical analysis using SPSS16.0 was carried out thereafter. Then yields of flexible fiber-optic bronchoscopy were noted.

Results

Table-1. Age distribution of the study patients (n=50)

Age (in years)	Number of patients	Percentage
≤30	2	4.0
31-45	10	20.0
46-60	19	38.0
61-75	17	34.0
>75	2	4.0
Mean ± SD	56.8 ±12.55	
Range(min, max)	(25,85)	

The youngest patients were of 25 years old and the oldest one was of 85 years of age. It was observed that highest 38% of the patients belonged to age group 46-60 years. The mean age was found 56.8 ±12.55 years (Table 1).

Table 2. Distribution of the study patients by sex (n=50)

Sex	Number of patients	Percentage
Male	41	82.0
Female	9	18.0

Majority 41 (82.0%) of the patients were male and the rest 9 (18.0%) were female. Male to female ratio was 4.5:1 (Table-I).

Table 3. Distribution of the study patients according to chest X-ray P/A view findings (n=50)

Chest X-ray P/A view findings	No (n=50)	Percentage
Consolidation/Mass lesion	20	40%
Unilateral or bilateral hilar enlargement	6	12%
Solitary or multiple nodules	8	16%
Lung, lobe or segmental collapse	15	30%
Rib destruction	1	2%

The study shows that majority 20 (40%) patients had consolidation/mass lesion in their chest X-ray. Second common chest X-ray P/A view finding was lung, lobe or segmental collapse (Table 3).

Table 4. Distribution of the study patients according to bronchoscopy findings (n=50)

Bronchoscopy findings	Number (n=50)	Percentage
No endobronchial lesion/normal	10	20%
Inflammatory lesion	11	22%
Endobronchial growth	23	46%
Inconclusive	6	12%

Here it shows that majority 23(46%) patients had endobronchial growth. Second most common finding was inflammatory lesion (Table 4).

Table 5. Distribution of the study patients according to diagnosis on histopathology (n=34)

Findings on histopathology	Number (n=34)	Percentage
Normal	1	2.94%
Inconclusive	1	2.94%
Neoplastic	12	35.29%
Non-neoplastic		
Tuberculosis	7	20.58%
Non-specific inflammation	9	26.47%
Sarcoidosis	2	5.88%
Aspergilloma	1	2.94%
Inadequate sample	1	2.94%

Majority of patients 12(35.29%) was diagnosed as neoplastic lesion. Second most common diagnosis was 9(26.47%) non-specific inflammation followed by tuberculosis 7(20.58%). Only 1(2.94%) inadequate sample was found on biopsy (Table 5).

Table 6. Distribution of the study patients according to cell type of carcinoma (n=12)

Cell type of malignancy	Number(n=12)	Percentage
Squamous cell carcinoma	7	58.33%
Adenocarcinoma	3	25%
Small cell carcinoma	1	8.33%
Others	1	8.33%

Of the samples, 7(58.33%) was squamous cell carcinoma. Second commonest was adenocarcinoma 3(25%) (Table6).

Table 7. Distribution of the study patients according to final diagnosis on histopathology of the study population that had consolidation/mass lesion on chest X-ray P/A view(n=20)

Final diagnosis	Number (n=20)	Percentage
Tuberculosis	4	20%
Malignancy	5	25%
Non-specific inflammation	3	15%
Aspergilloma	1	5%
Normal	7	35%

Majority 7 (35%) of the patients had normal bronchoscopy finding. Second commonest was 5(25%) malignancy followed by 4(20%) tuberculosis (Table 7).

Table 8. Distribution of the study population according to unilateral or bilateral hilar enlargement on chest X-ray and final diagnosis (n=6)

Final diagnosis	Number (n=6)
Tuberculosis	2
Sarcoidosis	2
Non-specific inflammation	1
Normal	1

In respect to final diagnosis of the study population who had unilateral or bilateral hilar enlargement on chest X-ray, study shows tuberculosis and sarcoidosis were most common diagnosis among the patients who had unilateral or bilateral hilar enlargement on their chest X-ray (Table 8).

Table 9. Distribution of the study population according to solitary or multiple nodules on chest X-ray and final diagnosis (n=8)

Final diagnosis	Number (n=8)
Tuberculosis	1
Malignancy	2
Non-specific inflammation	2
Normal	3

Majority, 3(37.5%), came out to be normal among patients who had solitary or multiple nodules on chest X-ray (Table 9).

Table 10. Distribution of the study population according to lung, lobe or segmental collapse on chest X-ray and final diagnosis (n=9)

Final diagnosis	Number (n=9)
Malignancy	4
Non-specific inflammation	3
Normal	2

Of 9 patients who had lung, lobe or segmental collapse on chest X-ray, 4 (44.4%) came out to have malignant lesion (Table 10).

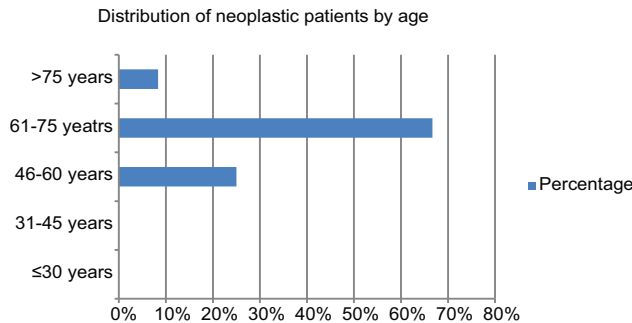


Figure 1. Bar diagram showing distribution of neoplastic patients by age

Majority malignant patients 8 (66.67%) were at 61-75 years age range (Figure 1).

Table 11. Distribution of tuberculosis patients according to age (n=7)

Age (in years)	Number (n=7)	Percentage
≤30	1	14.28%
31-45	4	57.14%
46-60	2	28.58%
61-75	0	0%
>75	0	0%

Majority 4(57.14%) is in the age group of 31-45 years (Table 11)

Discussion

A total number of 50 cases were studied during the study period in medicine and respiratory department of DMCH. Mean age of the respondents was 56.8 years with age range from 25 to 85 years. The lowest age of the patients was found to be 25 years, while the highest one was 85 years. In our study, maximum 38.0% of patients belonged to age group 46-60 years, followed by 34.0% within 61-75 years age group, 20.0% within 31-45 years, 4.0% below 30 years and 4.0% above 75 years age group.

Out of all respondents in our series, 41 (82.0%) patients were male and 9 (18.0%) patients were female. Male-female ratio was 4.5:1. Although a similar study carried out by Sharma et al¹⁴ in 2015 the ratio was 2.57:1. The male predominance of the study may be due to fact that females are mostly neglected in our society and they usually do not get proper attention during their illness and also due to religious and social ground, they appear less commonly before medical facilities than males. Also respiratory problems are more common among males because incidence of smoking and exposure to different micro-organisms are more common in males. But the scenario is gradually changing with increasing level of awareness among general people as well as among women themselves.

Among the all respondents highest 21 (42%) are farmers. Farmers are followed by housewives 7(14%) and businessmen 7(14%). Remaining 6(12%) are day laborers, 4 (8%) are rickshaw pullers and 5(10%) are service holders. Bangladesh is an agricultural based country and maximum of its population reside in the village. They live by cultivation. Economic condition of the maximum farmers is not so good, so they come to Dhaka medical college hospital which is a largest government hospital of the country. Treatment here is almost free of cost. So, maximum patients in our study population are farmers by profession.

Of all the 50 respondents in this study maximum 46(92%) are married and remaining 4 (8%) are unmarried.

Among the all 50 respondents,26 (52%) patients monthly family income is less than 10,000 taka. 17(34%) patients monthly family income is 10,000-20,000 taka and 7(14%) patients monthly family income is more than 20,000 taka. According to the Bangladesh bureau of Statistics (BBS) report 2015, per capita income per year of Bangladesh was \$ 1314 which is around 8760 taka per month(1 USD=80 taka). So, the result of this study reflects the overall socio-economic condition of Bangladesh.

Chest X-ray P/A view findings shows that maximum 20 (40%) patients have consolidation or mass like lesion,

followed by 15 (30%) patients have lung, lobe or segmental collapse, 8(16%) patients have solitary or multiple nodules, 6(12%) patients have unilateral or bilateral hilar enlargement, and 1(2%) patient has rib destruction. This finding is consistent with a similar study carried out by Mahbub et al¹⁷ in 2012 conducted in NIDCH, Dhaka.

In this study, endobronchial growth was found in maximum 23(46%) patients during bronchoscopy, followed by 11(22%) showing inflammatory lesion. 10(20%) patients bronchoscopy findings showed normal findings and 6(12%) patients showed inconclusive results. Sharma et al (2015) showed that 45% patients had endobronchial growth, 6% had suspected growth, 11% showed non-specific inflammation, 30% bronchoscopy were inconclusive and 8% bronchoscopy were normal. A study done by Gahlot A. et al¹⁵ in 2016 showed endobronchial growth in 55.5% cases, non-specific inflammation in 18.2% cases, inconclusive in 11.2% cases and 14.5% bronchoscopy findings were normal. So, the results of this study were nearly consistent with Sharma et al¹⁴ and Gahlot A et al¹⁵.

Among the respondents of this study, biopsy were taken from 34(68%) cases of suspicious lesion and sent for histopathology. maximum 19(55.88%) patients showed non-neoplastic lesion. Among the non-neoplastic lesions 9(26.47%) showed non-specific inflammation, 7 (20.58%) showed tuberculosis, 2(5.88%) showed sarcoidosis and 1 (2.94%) showed aspergillosis. 12 (35.29%) cases showed neoplastic lesion, 1(2.94%) showed inconclusive results, 1(2.94%) showed normal results and 1(2.94%) showed inadequate sample. This result is nearly consistent with Sharma et al¹⁴ which showed 11.1% normal results, 6.94% inconclusive results, 30.5% neoplastic lesion, 2.7% inadequate sample and 48.47% non-neoplastic results. Among the non-neoplastic results 13.8% were tuberculosis, 8.3% were pneumoconiosis, 18.05% were non-specific inflammation, 6.94% were sarcoidosis and 1.38% were aspergilloma.

Among the 12 patients who were diagnosed as neoplastic lesion by histopathology, 7 (58.33%) cases were squamous cell carcinoma, 3 (25%) cases were adenocarcinoma, 1 (8.33%) showed small cell carcinoma and 1 (8.33%) showed mixed cell type of carcinoma. Gahlot A. et al¹⁵ showed 62.3% squamous cell carcinoma, 16.4% adenocarcinoma, 13.1% small cell carcinoma and 8.2% other types of carcinoma. Gaur DS and his colleagues¹⁶ in their study in 2007 found 29.6% squamous cell carcinoma, 19.7% small cell carcinoma, 12.7% adenocarcinoma, 36.6% poorly differentiated carcinoma and 1.4% carcinoid. Mahbub et al²² found 42.86% squamous cell carcinoma, 21.43% small cell

carcinoma, 10.71% adenocarcinoma, 25% non-specific cell types of carcinoma. So, in all the study squamous cell carcinoma is the main type of bronchial carcinoma which is also found in this study.

Of the 50 respondents, 20 cases had consolidation or mass like lesion in their chest X-ray. Among the 20 cases of consolidation or mass like lesion, 4(20%) cases were diagnosed as tuberculosis, 5 (25%) cases diagnosed as malignancy, 3 (15%) cases were diagnosed as non-specific inflammation, 1 (5%) case diagnosed as aspergilloma and 7 (35%) cases showed normal findings. So, malignancy is commoner diagnosis among consolidation/mass lesion in the chest X-ray in this study. This result is found because, after a course of antibiotic pneumonic lesions usually get resolved. But antibiotic do not resolve the lesions of malignancy and tuberculosis.

Among the 8 cases who had solitary or multiple nodules in chest X-ray, 1 case diagnosed as tuberculosis, 2 case as malignancy, 2 case as non-specific inflammation and 3 cases came out to be normal.

Among the 9 cases who had lung, lobe or segmental collapse in the chest X-ray, 4 cases were diagnosed as malignancy, 3 cases as non-specific inflammation and 2 cases came out to be normal.

Among the 12 neoplastic cases, 8 (66.67%) cases were in the 61-75 years age group, 3 (25%) cases were in 46-60 years age group and 1 (8.33%) case is in the more than 75 years age group. So, lung malignancy is more common in older age group. In the study of Mahbub and his colleagues¹⁷ most of the malignant patients were in the 51-70 years age group.

Among the 7 tuberculosis patients, 4 (57.14%) patients were in the 31-45 years age group, 2 (28.58%) patients were in 46-60 years age group and 1 (14.28%) patient is in the below 30 years age group. So, majority of tuberculosis patients (57.14%) are within the 31-45 years age group in this study.

Conclusion:

Early detection of lung diseases by flexible fiber-optic bronchoscopy is very much time demanding since successful treatment and prognosis depends on the identification of specific etiology. Fiberoptic bronchoscopy can be successfully employed for the diagnosis of lung diseases, including malignancies and granulomatous lesions when the lung lesion is found centrally. It is extremely useful in finding specific etiologies of various lung diseases. This study was conducted on a small sample. A multicenter study with large sample size should be undertaken to generalize the finding.

References

1. Rivera MP, Detterbeck F, Mehta AC. Diagnosis of lung cancer: the guidelines. *Chest*. 2003; 123(1):129-36.
2. Walker BR, Colledge NR, Ralston SH, Penman ID. Davidson's Principles & Practice of Medicine. 22nd Edition. Chapter: Respiratory disease.
3. Chung HS, Lee JH. Bronchoscopic Assessment of Evolution of Endobronchial Tuberculosis. *Chest*. 2000; 117(2): 385-92.
4. Martin KT. Fiberoptic bronchoscopy. RC educational consulting services. 2000:5-6.
5. Herth FJ, Eberhardt R, Ernst A. The future of bronchoscopy in diagnosing, staging and treatment of lung cancer. *Respiration*. 2006; 73(4): 399-409.
6. Gupta AA, Sehgal IS, Dhooria S, Singh N, Aggarwal AN, Gupta D et al. Indications of performing flexible bronchoscopy: Trends over 34 years at a tertiary care hospital. *Lung India*. 2015;32(3):211-5.
7. Sawy MS, Jayakrishnan B, Behbehani N, Abal AT, Nair MG. Flexible fiberoptic bronchoscopy. Diagnostic yield. *Saudi Med J*. 2004;25(10):1459-63.
8. Prakash UB. Advances in Bronchoscopic Procedures. *Chest*. 1999;116(5):1403-8.
9. Simon M, Simon I. Update in bronchoscopic techniques. *Pneumologia*. 2010; 59(1):53-6.
10. Aristizabal JF, Young KR, Nath H. Can Chest CT decrease the use of evaluation of suspected bronchogenic preoperative bronchoscopy in the carcinoma?. *Chest*. 1998;113(5): 1244-9.
11. Martini N, McCormick PM. Assessment of endoscopically visible bronchial carcinoma. *Chest*. 1978; 17(5 suppl): 718-20.
12. Garg B, Sood N, Sidhu UP, Malhotra V. Role of fiber-optic bronchoscopy and utility of bronchial washings and brushings in the diagnosis of lung diseases. *Indian J Chest Dis Allied Sci*. 2013; 55(3): 145-8.
13. Schoch OD, Rieder P, Tueller C, Altpeter E, Zellweger JP, Rieder HL et al. Diagnostic Yield of Sputum, Induced Sputum, and Bronchoscopy after Radiologic Tuberculosis Screening. *Am J Respir Crit Care Med*. 2007; 175(1) :80-6.
14. Sharma A, Gandotra N. Role of Fiberoptic Bronchoscopy in Establishing the Diagnosis of Various Lung Diseases in a Tertiary Care Hospital; *International Journal of Science and Research (IJSR)*. 2015;4(10):1498-1500.
15. Gahlot A, Mogra N. Role of Fiberoptic Bronchoscopy in Histopathological Analysis of Lung Lesions. *IAIM*. 2016; 3(4): 130-35.
16. Gaur DS, Thapliyal NC, Kishore S, Pathak VP. Efficacy of Broncho-Alveolar Lavage and Bronchial Brush Cytology in Diagnosing Lung Cancers. *Journal of Cytology*. 2007; 24 (2): 73-77.
17. Mahbub I. Diagnostic yield of fiber-optic bronchoscopy in clinically and radiologically suspected cases of bronchial carcinoma.